METHOD 7131A

CADMIUM (ATOMIC ABSORPTION, FURNACE TECHNIQUE)

1.0 SCOPE AND APPLICATION

    1.1   See Section 1.0 of Method 7000.

2.0 SUMMARY OF METHOD

    2.1   See Section 2.0 of Method 7000.

3.0 INTERFERENCES

    3.1   See Section 3.0 of Method 7000 if interferences are suspected.

    3.2   In addition to the normal interferences experienced during graphite
furnace analysis, cadmium analysis can suffer from severe nonspecific absorption
and light scattering caused by matrix components during atomization. Simultaneous
background correction is required to avoid erroneously high results.

    3.3   Excess chloride may cause premature volatilization of cadmium.
Ammonium phosphate used as a matrix modifier minimizes this loss. Other
modifiers may be used as long as it is documented with the type of suppressant
and concentration.

    3.4   Many plastic pipet tips (yellow) contain cadmium. Use "cadmium-
free" tips.

4.0 APPARATUS AND MATERIALS

    4.1   For basic apparatus, see Section 4.0 of Method 7000.

    4.2   Instrument parameters (general):

        4.2.1   Drying time and temp: 30 sec at 125°C.

        4.2.2   Ashing time and temp: 30 sec at 500°C.

        4.2.3   Atomizing time and temp: 10 sec at 1900°C.

        4.2.4   Purge gas: Argon.

        4.2.5   Wavelength: 228.8 nm.

        4.2.6   Background correction: Required.

        4.2.7   Other operating parameters should be set as specified by the
    particular instrument manufacturer.

NOTE: The above concentration values and instrument conditions are for a Perkin-Elmer HGA-2100, based on the use of a 20-uL injection, continuous-flow purge gas, and nonpyrolytic graphite. Smaller sizes of furnace devices or those employing faster rates of atomization can be operated using lower atomization temperatures for shorter time periods than the above-recommended settings.

5.0 REAGENTS

5.1 See Section 5.0 of Method 7000.

5.2 Preparation of standards:

5.2.1 Stock solution: Dissolve 1.000 g of cadmium metal (analytical reagent grade) in 20 mL of 1:1 HNO_3 and dilute to 1 liter with reagent water. Alternatively, procure a certified standard from a supplier and verify by comparison with a second standard.

5.2.2 Prepare dilutions of the stock cadmium solution to be used as calibration standards at the time of analysis. To each 100 mL of standard and sample alike add 2.0 mL of the ammonium phosphate solution. The calibration standards should be prepared to contain 0.5% (v/v) HNO_3.

5.2.3 Ammonium phosphate solution (40%): Dissolve 40 g of ammonium phosphate, $(NH_4)_2HPO_4$ (analytical reagent grade), in reagent water and dilute to 100 mL.

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

6.1 See Chapter Three, Section 3.1.3, Sample Handling and Preservation.

7.0 PROCEDURE

7.1 Sample preparation: The procedures for preparation of the sample are provided in Chapter Three, Section 3.2.

7.2 See Method 7000, Section 7.3, Furnace Procedure. The calculation is provided in Method 7000, Section 7.4.

8.0 QUALITY CONTROL

8.1 Refer to Section 8.0 of Method 7000 .

9.0 METHOD PERFORMANCE

9.1 Precision and accuracy data are available in Method 213.2 of Methods for Chemical Analysis of Water and Wastes.

9.2   The performance characteristics for an aqueous sample free of inter-
ferences are:

        Optimum concentration range: 0.5-10 ug/L.
        Detection limit: 0.1 ug/L.

        9.3   The data shown in Table 1 were obtained from records of state and
contractor laboratories. The data are intended to show the precision of the
combined sample preparation and analysis method.

10.0 REFERENCES

1.   Methods for Chemical Analysis of Water and Wastes, EPA-600/4-82-055,
December 1982, Method 213.2.

2.   Gaskill, A., Compilation and Evaluation of RCRA Method Performance Data,
Work Assignment No. 2, EPA Contract No. 68-01-7075, September 1986.

TABLE 1. METHOD PERFORMANCE DATA

Sample Matrix	Preparation Method	Laboratory Replicates
Lagoon soil	3050	0.10, 0.095 ug/g
NBS SRM 1646 Estuarine sediment	3050	0.35 ug/g[a]
Solvent extract of oily waste	3030	1.39, 1.09 ug/L

[a]Bias of -3% from expected value.

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          │  5.2 Prepare    │
          │  standards.     │
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          │  7.1 For sample │
          │  preparation see│
          │ Chapter 3,Section│
          │      3.2.       │
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          │ 7.2 Analyze using│
          │  Method 7000    │
          │  Section 7.3.   │
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